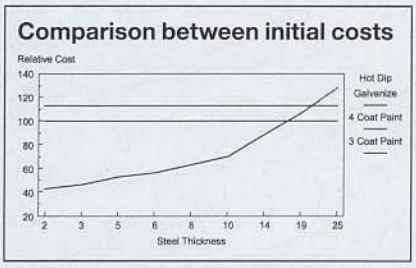
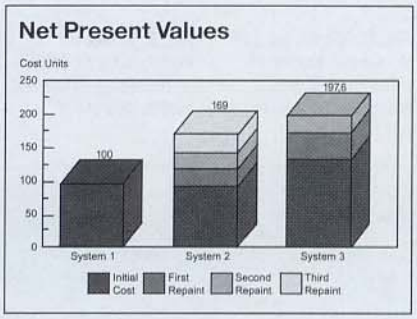
# Hot Dip Galvanizing Data Sheet GA

# 5.3 The Economics of Hot Dip Galvanizing




## 5. Initial cost

In initial cost terms, how does galvanizing compare with paint systems? Put simply it is comparable with a good paint system. A recent survey in the UK found that hot dip galvanizing was more expensive than a very simple "wire brush followed by a primer" coating but was less expensive than grit blasting followed by a multicoat system (fig. 3). The reason is that paint systems, especially when applied on site, are labour intensive. The more coats, the more expensive it is. Galvanizing by comparison is not so labour intensive. Being a dipping process it is also more advantageous for thinner section steelwork that has a high surface area per tonne. The large area would take a lot of time to paint but can be galvanized very quickly. Conversely, heavy structural steelwork with a low surface area per tonne appears to be less economic but the argument is not so simple as several other factors are involved.

Hot dip galvanizing is carried out in a factory under closely controlled conditions. Climatic variables such as temperature, humidity and wind have absolutely no effect on the galvanizing process and the finished coating has to conform to national standards. Structural steelwork, by its very name, will be assembled on site, and if it is to be painted, will often by painted on site. This introduces a number of variables to the quality of the paint coating. Temperature can affect curing times, humidity and condensation can affect adhesion but the greatest danger is that inevitably some areas will be inaccessible and not receive any coating at all. Galvanizing covers everything. If painting is carried out off site then gentle transportation and site handling are vital because, in comparison with a galvanized coating, paint is extremely delicate.

## 6. Lifetime costs

As mentioned in 4 above, there are ways of calculating the benefits or disadvantages of different methods of corrosion protection. The most common method is to calculate the Net Present Value (N.P.V.) of each method and compare the results. This calculation takes into account the cost of borrowing money, the initial cost of protection, subsequent maintenance costs and the lifetime of the project. It is frequently used by companies to measure the likely outcome of a capital investment project.

$$NPV = I + \frac{M_1}{(1+r)^{P1}} + \frac{M_2}{(1+r)^{P2}} + \text{etc.}$$

Where $I$ = Initial cost of protective system
$M_1$ = Cost of maintenance in year $P_1$
$M_2$ = Cost of maintenance in year $P_2$
$r$ = Discount rate

Example:
Take the case of a steel structure that has a projected life of 25 years and for which the discount cost of capital is 5%.

### Protection system 1.

Hot dip galvanize to most international standards with a minimum average coating of 85µm on steel of 5mm or more thick. As galvanizing to this standard has a life expectancy of between 18 and 60 years in the UK*, it is reasonable to project a life of 25 years without further maintenance. Let the cost of galvanizing be a base figure of 100 units.
There are no further maintenance costs.

$NPV = 100$

### Protection system 2.

A paint system consisting manual cleaning followed by three coats of alkyd paint. This system has a life expectancy of 8 years and so will need to be repainted three times in 25 years. The initial cost is slightly cheaper than hot dip galvanizing at 90 units. The cost of repainting for the first two occasions is 45 units but goes up to 90 units for the third repaint when the original paint must be removed. When future expenditures ar discounted to a present value basis using a discount rate, 56 5 percent, the outcome is:

$$NPV = 90 + \frac{45}{(1+.05)^8} + \frac{45}{(1+.05)^{16}} + \frac{90}{(1+.05)^{24}}$$

$= 169$

### Protection system 3.

A superior paint system consisting of blast cleaning followed by three coats of epoxy and alkyd paint. This system has a life expectancy of 11 years and will need to be repainted twice in 25 years. The initial cost is higher than the other paint system (because of the grit blasting and epoxy paint) at 135 units. The cost of repainting is half this value at 67.5 units.

$$NPV = 135 + \frac{67.5}{(1+.05)^{11}} \quad \frac{67.5}{(1+.05)^{22}}$$

$= 197.5$

| Protective systems | Hot dip galvanized | Paint (1) | Paint (2) |
|---|---|---|---|
| BS 5493 equivalent | SB1 | SF3 | SF6 |
| Surface preparation | None | Manual clean CSt2 | Blast clean SA2 1/2 |
| Initial treatment | None | Zinc phosphate modified alkyd 35 µm | PVB etch or zinc phosphate epoxy 20 µm |
| Intermediate treatment | None | H.B.zinc phosphate modified alkyd 75 µm | H.B.zinc phosphate modified alkyd 75 µm |
| Final treatment | Hot dip galvanize 85 µm min. | H.B. alkyd 60 µm | H.B. alkyd 60 µm |
| Life expectancy (yrs) | 25+ | 8 | 11 |
| No. of reapplications in 25 years | 0 | 3 | 2 |
| Relative initial Cost | 100 % | 90 % | 135 % |

**Life expectancy and relative cost comparison of hot dip galvanized and two paint coatings in a normal inland environment.**

## Conclusion

It can be seen that over a 25 year project life the cost of a "cheaper" paint system is almost 70% more than the cost of galvanizing. Likewise the cost of a more "expensive" paint system is almost double that of galvanizing.
In initial or first cost terms hot dip galvanizing is comparable with a good quality paint system. However, when looking at lifetime costs, hot dip galvanizing works out to be considerably cheaper than any other system.
(* UK Atmospheric Corrosivity Values, 1986-1991 published by Farm Building Research Team, Agricultural Development Advisory Service, Reading, UK.)

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